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**Momentum in Variation.**—It is a little late to criticize an article that appeared in November, 1905, nevertheless I should like to say a word or two in regard to the paper by Mr. F. B. Loomis entitled "Momentum in Variation." The conclusion is reached that a variation started along any line tends to carry that line of development to its ultimate, being driven by momentum. If the feature is detrimental, the group dies out. If, however, it is merely a minor feature, it makes a handicap.

No one doubts that in the course of evolution, specialization goes so far as to carry a given species or group out of existence, but that this is of such widespread occurrence as Mr. Loomis implies, is open to doubt. Certainly the statements which he adduces to support this theory, are in many cases erroneous and in other instances open to quite other deductions than are placed upon them.

The few comments here given, are not at all in the line of captious criticisms, but are merely intended as a protest against any such short-cut to a solution of important problems as that taken in the paper in question.

If we begin with the Saber-toothed Tigers, which are cited as examples of extinction due to overdevelopment, we may go back about twenty years to the time when Professor Cope reached a similar conclusion, saying in the course of some discussion that *Smilodon* undoubtedly became extinct because it could not obtain food, whereupon someone present arose and said: "Mr. Cope, what did the *Smilodon* feed on"? In connection with this Dr. Matthew has recently brought forward some facts tending to show that the long tusks of *Smilodon* were of service in cutting through the long hair and thick hide of some of the contemporary ground sloths. Certainly if the tusks of *Smilodon* caused its extinction, why does not the Walrus die out for a similar cause? The Mammoth with its extreme development of tusks is also cited to illustrate the principle of momentum in variation, leading to extermination, but the great Gangetic elephant which shows the most enormous development of tusks, became extinct long ago, while other members of the race whose tusks were far more recurved lived on. Nor did those mastodons in which the tusks were greatly curved, come to an untimely end one whit sooner than their contemporaries with fairly straight tusks. The African Elephant, which is much the most primitive in structure of existing species, and more nearly resembles *E. ganesa* in tusk development, is the species that has thrived best. Moreover, the African elephant is the one in which tusks are present in both sexes while a large proportion of the

females of Asiatic Elephants are tuskless, so that here we have a case in which tusk development has gone beyond sex differentiation.

If Babirussa seems to be handicapped by its teeth, though there is another side to the case, how about Mesopiodon, in one species of which the teeth lock over the beak so that the animal can open its mouth for a short distance only and yet shows no signs of passing out of existence.

The elongation of the snout of Teleosaurus is cited as another disadvantageous character but the Gangetic Gavial in which the snout is nearly as long, finds this of great service in catching fish, as undoubtedly Teleosaurus did, and Dr. Abel gives elongation of snout as characteristic of fresh-water cetaceans.

Stegosaurus did not come to an end on account of its heavy armor but from some other cause, for the active predatory dinosaurs, such as Allosaurus, that were unincumbered by any defensive armor, died out just as did their heavier-plated contemporaries. The male Narwhal which has a single long tusk lives in the same sea and just as long and happily as his tuskless spouse, and many similar instances might be cited. The problem of the extinction of animals is far too complicated to be decided in haste and few of the examples cited by Mr. Loomis seem to be conclusive.

F. A. LUCAS

**Xenia in Wheat.**<sup>1</sup> — As everyone has noticed, when white sweet corn is pollinated with red corn the outer part of the grains, although not truly part of the embryo, is red. This is a case of so called xenia. Xenia has been observed in other cases also, notably in beans and in wheat. Tschermak has recently studied xenia in wheat in more detail. He experimented with two races — the Hanna wheat and the Petkus wheat. Both kinds of wheat when in bud yield both green and yellow seeds; but yellow Hanna wheat gives 80% of yellow grains and green Petkus wheat breeds almost pure (95% of green seeds). The green Hanna and the yellow Petkus wheats when inbred yield only about half of their own kind respectively. Tschermak finds that when green and yellow Hanna wheats are cross-bred the seeds resulting show the color of the mother stock, whichever is so used. Likewise when the green and the yellow Petkus wheats are crossed

<sup>1</sup> Tschermak, E., "Ueber Züchtung neuer Getreiderassen mittels Künstlicher Kreuzung, II." *Zeitschr. f. d. landw. Versuchswesen in Oesterreich*, 45. pp., Feb., 1906.